

arranged in two major zoogeographic groups: endemics (in Panamá, or in Panamá and Costa Rica); and species that are more wide-ranging. In turn, species in the latter group are arranged in three subgroups: widespread (in other parts of Central America, Panamá, and South America); those in Panamá and South America, only; and those in Panamá and Central America, only. This last group, plus the Panamanian endemics, comprise the endemic Central American fauna, which represents 52 per cent of the total. The authors correlate this high rate of endemism in Central America with isolation, by seaways, of Central America from South America, during much of the Tertiary period. They infer that, during the time of isolation, differentiation took place. Further, they propose that species occurring now in both Central and South America attained the present ranges when the seaways were closed as a result of orogenies in Central America, leading to development of emergent land, and a terrestrial connection of the two areas. This proposed sequence of events accounts nicely for the observed patterns, and correlates well with inferences of various other recent authors, who have studied distribution patterns of other taxa in Middle America.

A more detailed examination of the data shows that average body size is smaller for members of Panamanian endemic species than it is for members of the wide-ranging groups. From this, Howden and Young infer that smaller size may be correlated with flight behavior as it relates to foraging, which in turn may relate to dispersal. Thus, the smaller species may be inherently less vagile than are the larger ones. Hence, they have remained in their areas of origin, that is, the areas that were above sea level during Tertiary times.

This is a reasonable explanation, but I wonder if more might be involved than dispersal ability. The small endemics might represent older, less progressive stocks, and might have remained in their areas of origin because they have been unable to compete successfully with later-evolving, more progressive stocks comprised of species whose adults attain large size. To test this hypothesis, a phylogenetic analysis of the scarabaeine fauna of Middle America is required, and this the authors have not undertaken—nor do they recommend such an analysis. In my view, this is an unfortunate oversight, for the missing system of hypotheses limits markedly ability to interpret the zoogeographic data.

In spite of this one omission, the publication overall is fine, and contains information of value to a wider range of biologists than those who wish to identify their Panamanian scarabaeines. It should be on the shelves of coleopterists in particular, systematic entomologists in general, ethologists, and biogeographers.

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Reigert, P.W. 1980. From arsenic to DDT: A history of entomology in western Canada. xii + 357 pp. University of Toronto Press. Price:\$30.00. ISBN 0-8020-5499-4.

Perhaps more than any other group of scientists, entomologists revel in writing histories of themselves and their science. Although some of these (e.g. Mallis, "American Entomologists"; Weiss, "The Pioneer Century of American Entomology") briefly mention Canadian entomology, Riegert's book represents the first attempt to collect the history of entomology in any part of Canada in one place. The book is organized into four parts encompassing 20

chapters. "Early encounters"(Part I) describes problems encountered by early explorers(e.g. Hearne, Palliser, Henry, Thompson), boundary surveyors and settlers with biting flies and grasshoppers. This section is perhaps the most interesting in the entire book. Riegert makes good use of quotes from various travellers that help in conveying a sense of the real suffering endured by these people. The section concludes with a chapter about collectors and naturalists. Part II("The first professionals") describes the beginnings of the federal and provincial entomological services. It traces the efforts of such notables as Fletcher, Hewitt, Criddle and Strickland in establishing pest monitoring and control programs. Part III ("Insects of British Columbia") follows the work of such people as Hearle, Downes, Glendenning, and Buckell in controlling various crop pests, mosquitoes and grasshoppers. It concludes with a short chapter about insect pests of Indian orchards. Part IV is entitled "Insects of the prairies" and deals in great detail with outbreaks of wheat stem sawfly, various species of larvae and, above all, grasshoppers. In fact, nearly 25% of this book is devoted to grasshopper outbreaks. Such figures as King, Strickland, Criddle, and Seamans are prominent. Part V(Specialization) has chapters dealing with livestock pests, stored products pests, entomology in universities and a summary chapter. Parts II through V deal with pest control problems(except Chapter 19). They are written in a clear, unambiguous, though rather mundane style that traces pest control incident by incident. These sections are livened every now and then with anecdotes but these are few and far between. There are several odd inclusions that seem to be afterthoughts. Chapter 17(Pests, paralysis and plagues) ends with an account of *Grylloblatta campodeiformis*(see below), an insect species that is not a pest and has nothing to do with paralysis or plagues. Chapter 16 is entitled "Worms". The choice of title is poor. The animals described are not worms(e.g., Annelida, Cestoda, Platyhelminthes etc.) and use of this term is misleading to lay readers, unnecessary for entomologists and wrong for both.

There are more general problems that seriously compromise this book. The first is one of mistaken emphasis. Riegert states(pp. 4) "Because this is a history of entomology and not a history of entomologists, the present chronicle will follow insects rather than man..." is unfortunate for it is the people who study a science that breathe the life into it: it is their ideas, foibles, frustrations and passions that make history. Dr. Riegert's insistence on using insects as the main characters excludes most information that would make the people involved seem more real. There are tantalizing anecdotes about William Downes and Eric Hearle that hint at some interesting facets of their character but these are not pursued. The team of E.R. Buckell, A. Dennys and A.D. Heriot are described as "the most colorful that Canadian entomology has known" but little of this colour is brought home to the reader. I was left perplexed by this since other historical essays by Riegert(e.g. Proc. ent.Soc. Alta. 25: 4-15) have far more personality written into them. Questions of how the strengths, weaknesses, personalities and interactions of these men helped (or hindered) the development of entomology are left largely unexplored. Using insects as the focus for this book also leads to a disconcerting lack of continuity. The narrative leaps from one insect outbreak to another and it is difficult to gain any appreciation of the flow of events.

The second problem is one of imbalance. This is, in the main, a history of *applied* entomology. Those who study insects with satiation of intellectual curiosity rather than pest control as their goal will find little to identify with. For example, the life of F.H. Wooley Dod, described as "one of the two leading Lepidopterists on the North American Continent", rates the same amount of space as an account of how a mixture of arsenic bait for grasshoppers was prepared. At one point(Chapter 10), entomology is even forsaken for a nearly two page